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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/964,995 | 09/27/2001 | Kazuo Ogawa | N29748500S | 2991 |

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| EXAMINER | |
|---|---|
| TRAN, THIEN F | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2811 | |

DATE MAILED: 03/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/964,995 | OGAWA, KAZUO | |
| | Examiner | Art Unit | |
| | Thien F Tran | 2811 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3,5-7 and 9-25* is/are pending in the application.

4a) Of the above claim(s) *12-20 and 22-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-7,9-11 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/02/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/02/2004 has been entered.

### *Election/Restrictions*

Newly submitted claims 22-25 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: claims 22-25 are directed to an intermediate structure of Figure 1d having a neutral radical pullback etch defined edge above the trench and a substrate portion of the liner oxide film terminating beyond the neutral radical pullback etch defined edge, the intermediate structure is a different patentably species from original claims drawn to a final structure of Figure 2c having semiconductor elements (first doped channel layer 12 and second doped channel layer 14).

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 22-25 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 21 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 claims a final structure of Figure 2(c) wherein the trench element separation region separate semiconductor elements 12 and 14. There is no support in the final structure of Figure 2(c) an oxide film 6 terminates beyond the edges of the trench filling insulating material 8 above the inner walls. The limitation recited in claim 21 is supported only in an intermediated structure of Figure 1(d) but not in Figure 2(c).

Claim 21 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. There is no support in the final structure of Figure 2(c) an oxide film 6 terminating beyond the edges of the trench filling insulating material 8 above the inner walls. In fact, the oxide film 6 terminates on the same plane with the edges of the trench filling insulating material 8 as shown in Figure 2(c).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 5-7, 9, 11 and 21 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ishitsuka et al. (USPN 6,242,323 of record).

Ishitsuka et al. discloses the claimed semiconductor device (Fig. 32) comprising a trench element separation region 4 including a trench 4a formed in a surface of a semiconductor substrate, the trench element separation region isolating separate semiconductor elements (isolating a first doped channel layer 14 of a first insulated gate field effect transistor from a second doped channel layer 15 of a second IGFET); an oxide film 5 (see Fig. 16) formed on inner walls of the trench; a trench filling insulating material 7 filling the trench and having (vertical) edges above the inner walls of the trench; and wherein inner wall edges in a top section of the trench and the edges of the trench filling insulating material are formed so as to be essentially located on the same vertical plane when viewed in cross section.

The claim limitation reciting the edges of the trench filling insulating material being defined by direct contact with side edges of a sacrificial layer formed by a pull

back etching process including a neutral radical performed before filling the trench (for the trench filling process) in claims 1 and 7; and the limitation reciting the etching process including a fluorine radical in claim 9 are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear. Claims 1 and 7 clearly claim a final structure as depicted by Figure 2(c) in the application wherein the trench element separation region separate semiconductor elements 12 and 14. As a result, the claim limitation reciting the edges of the trench filling insulating material being defined by direct contact with side edges of a sacrificial layer formed by a pull back etching process including a neutral radical performed before filling the trench (for the trench filling process) in claims 1 and 7 recite intermediate features in intermediate structures of Figures 1(c) - 1(d) of the application that no longer exist in the final structure (see Figure 2(c)). As far as device claims are concerned, the final structure as claimed "gleaned"

from the process steps is not patentably distinguished over the structure of the prior art reference.

Regarding claim 3, the sacrificial layer is a silicon nitride film.

Regarding claim 5, the semiconductors elements are insulated gate field effect transistors (IGFETs).

Regarding claim 6, the IGFETs include opposite conductivity types.

Regarding claim 11, the first and second doped channel layers (14, 15) are of opposite conductivity types.

Regarding claim 21, Figures 14-16 and 20 of Ishitsuka show the oxide film 5 formed below and terminating beyond the edges of the trench filling insulating material 7 above the inner wall in contact with oxide layer 2.

Claims 7, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bhakta et al. (USPN 6,258,697 of record).

Bhakta et al. discloses the claimed semiconductor device (Fig. 3G) comprising a trench element separation region including a trench 40 formed in a surface of a semiconductor substrate, the trench element separation region isolating a first doped channel layer 49 of a first insulated gate field effect transistor from a second doped channel layer 49 of a second IGFET; an oxide film 42 formed on inner walls of the trench; a trench filling insulating material 46 filling the trench and having edges above the inner walls of the trench defined by side edges of a sacrificial layer 34 (Fig. 3E); and wherein inner wall edges in a top section of the trench and the edges of the trench filling

insulating material are formed so as to be essentially located on the same plane when viewed in cross section.

The claim limitation reciting the edges of the trench filling insulating material being defined by direct contact with side edges of a sacrificial layer formed by a pull back etching process including a neutral radical performed before filling the trench in claim 7; and the limitation reciting the etching process including a fluorine radical in claim 9 are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear. Claim 7 clearly claims a final structure as depicted by Figure 2(c) in the application wherein the trench element separation region isolate a first doped channel layer 12 from a second doped channel layer 14. As a result, the claim limitation reciting the edges of the trench filling insulating material being defined by direct contact with side edges of a sacrificial layer formed by a pull back etching process including a neutral radical performed before filling the trench in claim 7 recite intermediate features

in intermediate structures of Figures 1(c) - 1(d) of the application that no longer exist in the final structure (see Figure 2(c)). As far as device claims are concerned, the final structure as claimed "gleaned" from the process steps is not patentably distinguished over the structure of the prior art reference.

Regarding claim 10, the first and second doped channel layers 49 are doped at the same time. It is inherent that the first and second doped channel layers 49 are doped of the same conductivity type.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F Tran whose telephone number is (571) 272-1665. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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March 5, 2004

THIEN TRAN
PRIMARY EXAMINER